

RIVERS AND FLOODS

By RICHMOND T. ZOCH

[River and Flood Division, Montrose W. Hayes, in charge]

The tropical disturbance which passed over the Middle Atlantic States on August 23-24 caused rises in all the rivers of these States and the Delaware and Susquehanna passed the flood stage.

Reading, Pa., and Phillipsburg, N.J., had, during this flood, the highest actual gage readings of record although the water did not exceed the high-water marks which were reached before gages were established at these places. At Trenton, N.J., the water reached the highest stage since 1913. The Susquehanna did not reach a very high stage. The Delaware River caused considerable damage but with this exception, the rivers caused relatively little harm, as most of the damage was in the creeks and small tributary streams.

Very heavy downpours at and west of the Colorado-Kansas boundary in the headwaters of the Smoky Hill River on August 4-5 caused floods there. The property damage in Wichita and Scott Counties of Kansas was estimated at \$57,000 which is a very large item for such a sparsely settled territory. The official in charge at Topeka, Kans., comments as follows on this flood:

This flood spread across the comparatively level country with a wall of water reported 10 to 15 feet high and in places attained a depth of 25 feet. In its wake was a trail of ruined fields, wrecked farm buildings, and dead stock. Every bridge across Ladder (Beaver) Creek in Wichita County was washed out. Regular channels were ignored as head waters rolled over parched fields, pushing in the van heaps of weeds, hay, sticks, and debris with such force that a cloud of dust was raised as the flood progressed.

The very heavy rains around Shreveport, La., on July 23-26 (see article in the July issue of the REVIEW) caused the Sabine River at Bon Wier, Tex., to rise from 10.4 on July 24 to 18.2 on July 25; it continued to rise until August 2, when it reached 23.0 feet, the highest stage of record. High stages were also reached at the other stations on the Sabine River.

A severe flood in Cherry Creek near Denver, Colo., will be discussed in a later issue of the REVIEW.

Table of flood stages in August 1933

[All dates in August unless otherwise indicated]

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
ATLANTIC SLOPE DRAINAGE					
Lackawaxen: Hawley, Pa.....	<i>Feet</i> 9	24	24	10.0	24
Schuylkill: Reading, Pa.....	10	24	25	19.7	24
Delaware:					
Phillipsburg, N.J.....	22	25	25	25.0	25
Trenton, N.J.....	12	25	25	12.7	25
Susquehanna:					
Wilkes-Barre, Pa.....	18	24	25	20.1	25
Harrisburg, Pa.....	14	25	25	15.2	25
Santee:					
Rimini, S.C.....	12	17	31	14.9	20
Ferguson, S.C.....	12	20	25	12.2	23-24
MISSISSIPPI SYSTEM					
Missouri Basin					
Smoky Hill: Lindsborg, Kans.....	21	24	24	23.9	24
Grand: Gallatin, Mo.....	20	22	23	22.8	22
Arkansas Basin					
Fountain: Fountain, Colo.....	8	2	2	12.0	2
North Canadian:					
Woodward, Okla.....	5	20	20	5.3	20
Canton, Okla.....	5	29	31	6.3	31
Canadian: Canadian, Tex.....	5	31	Sept. 1	6.3	Sept. 1
Arkansas: Arkansas City, Kans.....	15	27	27	6.3	27
		29	29	15.0	29
WEST GULF OF MEXICO DRAINAGE					
Sabine:					
Logansport, La.....	25	July 24	2	34.6	July 25
Bon Wier, Tex.....	21	July 27	10	23.0	2
Orange, Tex.....	4	1	11	5.1	5-6
Trinity: Dallas, Tex.....	28	July 31	1	34.8	1
Pecos: Fort Sumner, N.Mex.....	5	4	4	5.5	4
Rio Grande: Mercedes, Tex.....	20	8	8	20.2	8

THE WEATHER OF THE ATLANTIC AND PACIFIC OCEANS

[By the Marine Division, W. F. McDonald, in charge]

NORTH ATLANTIC OCEAN

By W. F. McDONALD

Atmospheric pressure.—The average pressure during August 1933, as of the two previous months, was below normal over the Atlantic between Cape Farewell and Iceland and also over the Antillean region, while the eastern Atlantic had a steady though small average excess in the monthly barometer values throughout the same period.

The highest pressures over the Atlantic during August were 30.40 to 30.50 inches, between the Azores and the English Channel on the first two days of the month, and again on the 20th between the Azores and Newfoundland. The lowest reported pressure was 28.54 inches, observed on the 23d off Cape Hatteras by the American tankship *R. J. Hanna* while in a tropical hurricane. Two days later the Polish steamship *Pulaski* recorded 28.78 inches near the center of a different depression (of extra-tropical origin) on the fifty-fifth parallel about midway between Belle Isle and Ireland.

The Atlantic HIGH was well developed and stable until August 23d, but it was greatly weakened thereafter, especially between the 24th and 28th, when the highest barometric readings were only 30.00 to 30.10 inches.

TABLE 1.—Averages, departures, and extremes of atmospheric pressure (sea level) at selected stations for the North Atlantic Ocean and its shores, August 1933

Stations	Average pressure	Departure	Highest	Date	Lowest	Date
	Inches	Inch	Inches		Inches	
Julianehaab, Greenland	29.62	—0.18	29.92	19	29.25	16
Reykjavik, Iceland	29.63	—0.18	30.11	11	29.08	17
Lerwick, Shetland Islands	29.80	—0.00	30.30	12	29.25	18
Valencia, Ireland	30.05	+0.13	30.44	3	29.57	15
Lisbon, Portugal	30.05	+0.03	30.20	14	29.90	24
Madeira	30.05	+0.02	30.18	14	29.87	15
Horta, Azores	30.21	+0.01	30.42	14	29.93	27
Belle Isle, Newfoundland	29.86	—0.03	30.16	21	29.42	3
Halifax, Nova Scotia	30.03	+0.02	30.38	7	29.76	26
Nantucket	30.00	+0.01	30.40	7	29.61	25
Hatteras	29.96	—0.04	30.24	7	28.67	23
Bermuda	30.07	—0.07	30.22	1, 2	29.66	21
Turks Island	29.97	—0.07	30.08	3	29.80	22
Key West	29.94	—0.04	30.07	14	29.71	22
New Orleans	29.96	—0.02	30.12	14	29.74	23
Cape Gracias, Nicaragua	29.86	—0.02	29.92	11, 12	29.76	23, 25

NOTE.—All data based on a.m. observations only, with departures compiled from best available normals related to time of observation, except Hatteras, Key West, Nantucket, and New Orleans, which are 24-hour corrected means.

Cyclones and gales.—The major storms of the month were of tropical origin, as discussed briefly under the succeeding topic heading and more fully in another place in this issue.

During all of the month, the higher latitudes of the Atlantic were almost continually under the influence of a succession of slow moving barometric depressions, central generally between Iceland and Labrador. These reached their deepest development and greatest extent on the 25th and 26th, when scattered gales occurred along the northern steamship lanes from the 25th to the 60th meridians, and the Polish steamship *Pulaski* on the 25th experienced winds reaching force 11 near the center (barometer 28.78 inches) of the main depression in mid-Atlantic, as noted above.

Cold front disturbances occurred at times on the southern side of the high-latitude depressions, especially during the first half of the month. The most vigorous of these, on the 1st, causing localized gales of force 10 above latitude 40° about half way between Newfoundland and the Azores.

Apart from these few occasions the Atlantic north of the 40th parallel was almost entirely free from gales during August.

Gales connected with tropical disturbances were experienced on some part of the waters south of latitude 40° and west of the 50th meridian on over half the days of the month, that is, from the 1st to 4th, 15th to 23d, and the last 3 days. These gales, while not in all cases clearly identified with active centers of low barometer, for the most part attended definite tropical disturbances.

Tropical disturbances.—The month began with a hurricane in progress in the Gulf of Mexico approaching the end of a long track that started a week earlier, beyond the island of Antigua. No ship in the Gulf seems actually to have encountered a well-defined center in this storm as it passed westward to the mouth of the Rio Grande, and the highest wind reported by marine observers was only a strong gale, in the eastern part of the Gulf, on the 1st. The storm center displayed full hurricane intensity, however, when it crossed the coast near Brownsville, Tex., on August 5.

The next tropical disturbance of major importance to shipping was of hurricane intensity on the 22d and 23d, as it crossed the main Gulf Stream sailing routes off Cape Hatteras, where many ships were involved. This hurricane is described in detail elsewhere in this issue. It receives comment here only with special reference to its effects on maritime commerce.

Throughout the long course of this storm, beginning in the little traveled ocean area, probably far east of the intersection of the 15th parallel and the 50th meridian, its progress was identified from day to day after the 16th in storm conditions reported by ships, and reproduced in the accompanying table of gales.

The highest wind experienced by any reporting ship along the storm track before the hurricane neared the coast, was of force 11, reported on the 18th by the French steamship *Cuba*, in the right-hand semicircle of the storm near latitude 22° N., longitude 53° W.

In the vicinity of Cape Hatteras and off the entrance to Chesapeake Bay, full hurricane intensity was experienced by a number of vessels, five of which (all American) the *Cities Service Kansas*, *Nebraskan*, *Trimountain*, *Shenandoah*, and *Bohemian Club*, have forwarded reports of winds reaching force 12 (hurricane). (See table.)

The synoptic weather charts for Greenwich mean noon of August 22 and 24 are reproduced herewith as charts X and XI, to show this storm as the center approached the coast, and again as it was rapidly diminishing in intensity after having passed inland over the Atlantic coastal region.

Notwithstanding the full hurricane intensity attained by this disturbance, and the considerable number of ships involved in its passage over the coastwise shipping routes, there was no major loss at sea, although small craft in coastal waters suffered disastrously.

At the end of the month another hurricane was in progress off the north coast of Cuba, having moved in the preceding 3 days steadily westward from the open Atlantic northeast of the Virgin Islands. The first ship to report hurricane winds in this storm was the Dutch steamer *Astrea*, which was not far from the center at 3:30 p.m. of August 30, about 10 miles north of Grand Turk Light. The barometer fell to 29.27 inches, hurricane winds were experienced for about 2 hours, and the wind direction shifted from west through southwest to south, without diminution in force about the time of lowest barometer. No other ship reported higher than whole-gale winds in connection with this disturbance in August, although hurricane intensity was again revealed as the center passed westward near Habana in the first days of September. Further notes regarding the marine phases of this storm in September will be carried in next issue.

Fog.—Fog had a normal distribution over the North Atlantic during August, being strongly banded between Cape Cod, the Grand Banks, and the entrance to the English Channel. It was reported at greatest frequency, on two thirds of the days of the month, southward from the Gulf of Maine, and on 10 to 14 days thence eastward to the Grand Banks. Elsewhere along the steamer routes fog occurred generally on only 3 to 7 days in the month.

Trans-Atlantic aviation.—The French aviators, P. Codos and M. Rossi, left New York early on August 5, with the object of crossing the Atlantic and continuing eastward in an effort to exceed the existing nonstop record. They landed 60½ hours later near Beirut, Syria, and so established a new record for distance in a single flight.

On August 8 General Italo Balbo and his squadron of 24 Italian army planes left Newfoundland for the Azores, arriving the same day. The flight from the Azores to Lisbon was accomplished on August 9.

The synoptic maps for August 6 and 8, to show conditions over the Atlantic at the time of these crossings, are given as charts VIII and IX.